



OPERATING INSTRUCTIONS

**IP Series
DUAL POWER AMPLIFIERS**

**IP-600D
IP-450D
IP-300D**

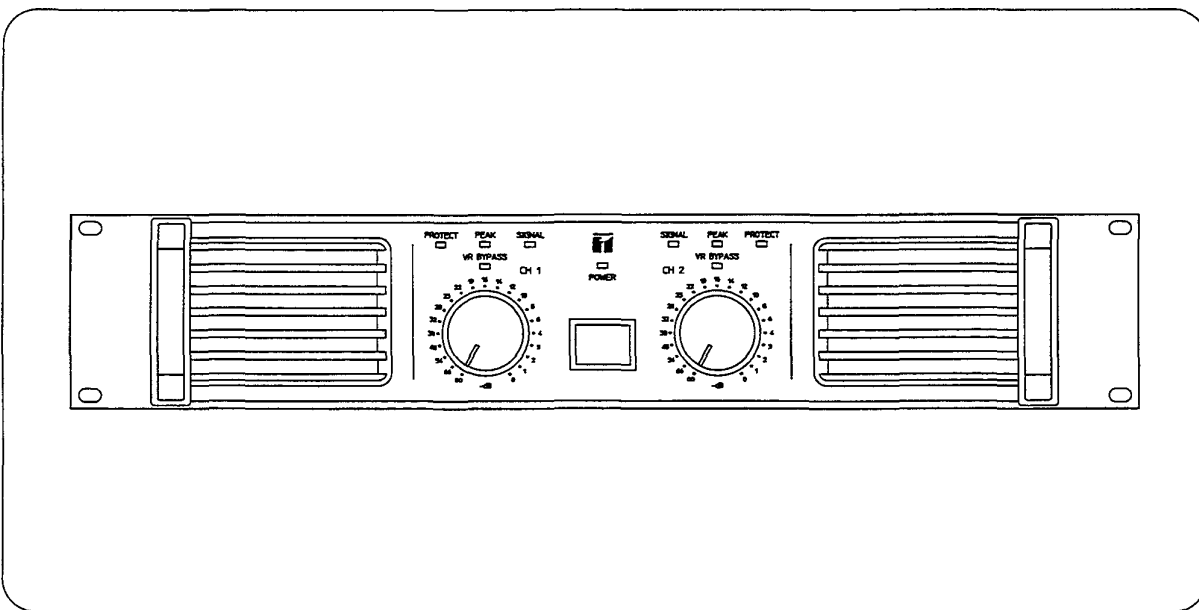


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Please follow the instructions in this manual to obtain the optimum results from this unit. We also recommend that you keep this manual handy for future reference.

TOA Corporation

1. SAFETY PRECAUTIONS

- Be sure to read the instructions in this section carefully before use.
- Make sure to observe the instructions in this manual as the conventions of safety symbols and messages regarded as very important precautions are included.
- We also recommend you keep this instruction manual handy for future reference.

Safety Symbol and Message Conventions

Safety symbols and messages described below are used in this manual to prevent bodily injury and property damage which could result from mishandling. Before operating your product, read this manual first so you are thoroughly aware of the potential safety hazards as well as understand the safety symbols and messages.



WARNING

Indicates a potentially hazardous situation which, if mishandled, could result in death or serious personal injury.



CAUTION

Indicates a potentially hazardous situation which, if mishandled, could result in moderate or minor personal injury, and/or proper damage.



WARNING

■ When Installing the Unit

- Do not expose the unit to rain or an environment where it may be splashed by water or other liquids, as doing so may result in fire or electric shock.
- Use the unit only with the voltage specified on the unit. Using a voltage higher than that which is specified may result in fire or electric shock.
- Do not cut, kink, otherwise damage nor modify the power supply cord. In addition, avoid using the power cord in close proximity to heaters, and never place heavy objects -- including the unit itself -- on the power cord, as doing so may result in fire or electric shock.
- Be sure to replace the unit's terminal cover after connection completion. Because the voltage of up to 100 V is applied to the output terminals, never touch these terminals to avoid electric shock.
- Avoid installing or mounting the unit in unstable locations, such as on a rickety table or a slanted surface. Doing so may result in the unit falling down and causing personal injury and/or property damage.
- Install the unit only in a location that can structurally support the weight of the unit and the mounting bracket. Doing otherwise may result in the unit falling down and causing personal injury and/or property damage.

■ When the Unit is in Use

- To prevent a fire or electric shock, never open nor remove the unit case as there are high voltage components inside the unit. Refer all servicing to your nearest TOA dealer.
- Do not place cups, bowls, or other containers of liquid or metallic objects on top of the unit. If they accidentally spill into the unit, this may cause a fire or electric shock.
- Do not insert nor drop metallic objects or flammable materials in the ventilation slots of the unit's cover, as this may result in fire or electric shock.
- Do not touch a plug during thunder and lightning, as this may result in electric shock.
- Should the following irregularity be found during use, immediately switch off the power, disconnect the power supply plug from the AC outlet and contact your nearest TOA dealer. Make no further attempt to operate the unit in this condition as this may cause fire or electric shock.
 - If you detect smoke or a strange smell coming from the unit.
 - If water or any metallic object gets into the unit.
 - If the unit falls, or the unit case breaks.
 - If the power supply cord is damaged (exposure of the core, disconnection, etc.)
 - If it is malfunctioning (no tone sounds.)

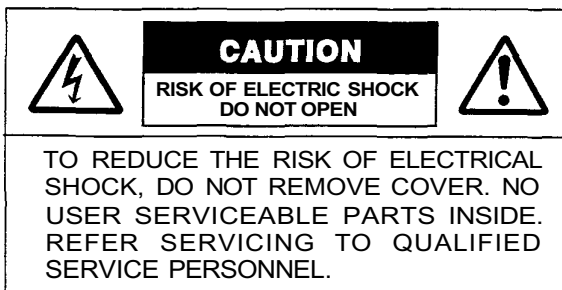
CAUTION

■ When Installing the Unit

- Never plug in nor remove the power supply plug with wet hands, as doing so may cause electric shock.
- When unplugging the power supply cord, be sure to grasp the power supply plug; never pull on the cord itself. Operating the unit with a damaged power supply cord may cause a fire or electric shock.
- When moving the unit, be sure to remove its power supply cord from the wall outlet. Moving the unit with the power cord connected to the outlet may cause damage to the power cord, resulting in fire or electric shock. When removing the power cord, be sure to hold its plug to pull.
- Do not block the ventilation slots in the unit's cover. Doing so may cause heat to build up inside the unit and result in fire.
- Avoid installing the unit in humid or dusty locations, in locations exposed to the direct sunlight, near the heaters, or in locations generating sooty smoke or steam as doing otherwise may result in fire or electric shock.
- When unpacking or moving the unit, be sure to handle the unit with two or more persons. Falling or dropping the unit may cause personal injury and/or property damage.

■ When the Unit is in Use

- Do not place heavy objects on the unit as this may cause it to fall or break which may result in personal injury and/or property damage. In addition, the object itself may fall off and cause injury and/or damage.
- Make sure that the volume control is set to minimum position before power is switched on. Loud noise produced at high volume when power is switched on can impair hearing.
- Do not operate the speaker for an extended period of time with the sound distorting. This is an indication of a malfunction, which in turn can cause heat to generate and result in a fire.
- Contact your TOA dealer as to the cleaning. If dust is allowed to accumulate in the unit over a long period of time, a fire or damage to the unit may result.
- If dust accumulates on the power supply plug or in the wall AC outlet, a fire may result. Clean it periodically. In addition, insert the plug in the wall outlet securely.
- Switch off the power, and unplug the power supply plug from the AC outlet for safety purposes when cleaning or leaving the unit unused for 10 days or more. A fire or electric shock may result.



The lightning flash with arrowhead within a triangle is intended to tell the user that parts inside the product are a risk of electric shock to persons.



The exclamation point within a triangle is intended to tell the user that important operating and servicing instructions are in the papers with the appliance.

2. GENERAL DESCRIPTION

TOA's IP series dual power amplifiers feature high durability, high quality sound and high output power (IP-300D: 300 W, IP-450D: 450 W, IP-600D: 600 W - when a 4 Ω load connected). Input/output levels and other functions can be remotely controlled from external equipment. (An interface unit is required. For details, contact your TOA dealer.) The amplifier is ideal for use in store sound systems, permanently-installed sound systems, and other sound systems.

3. FEATURES

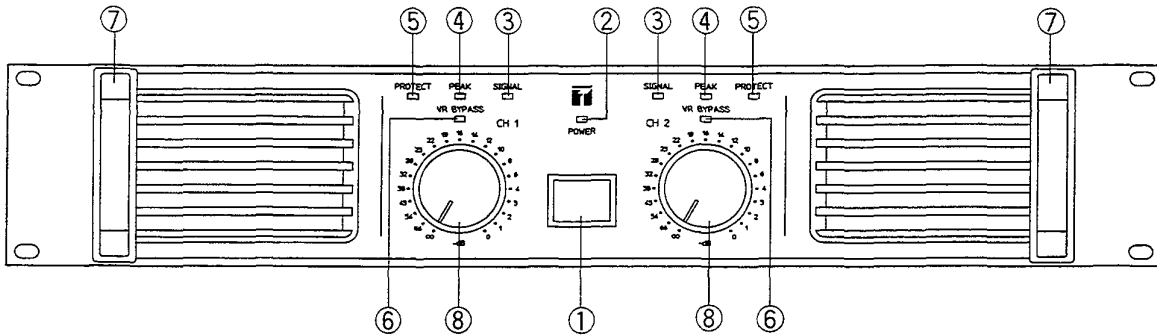
- Small in size (2-rack unit size) and light in weight.
- Variable forced-air cooling system changes the speed of a fan as the heat sink temperature varies, keeping fan operation noise low.
- The input is an electrically-balanced input, which can be converted into a transformer-balanced input using an optional input transformer.
- Three different output modes are made available for selection: Stereo, BTL and parallel outputs. In parallel mode, the input level of each channel can be set independently.
- An internal limiter limits the current during overload, and a protection circuit disconnects the output during an output short circuit by detecting the levels of both voltage and current. The protection circuit also disconnects the output during an abnormal temperature rise.
- Large output screw terminals (10 mm in width) allow connection of solderless terminals with diameter of 9.5 mm. Because two of each of positive (+) and negative (-) terminals are provided, even the four-core speaker cables can be connected.
- Control I/O terminal. Input and output levels can be remotely controlled or monitored from external equipment. (An interface unit is required. For details, contact your TOA dealer.)
- Detachable carrying handles even after the unit is installed in a rack.
- A push-lock level control and its cover prevent accidental setting changes after installation.
- An AC inlet simplifies the system maintenance after installation.

4. HANDLING PRECAUTIONS

- Line Source: 120 VAC \pm 10%, 60 Hz
Never connect the AC power cord to any other line voltage than that specifically designated.
- To avoid oscillation, keep the input cable away from the output cable. Particular care must be exercised when mounting the unit in an equipment rack.
- In some installations, a ground loop is formed and such noise as hum may be generated. In such cases, cut the loop by removing a shorting metal piece attached to the ground terminals on the rear panel. The noise can be reduced.
- These power amplifiers have a filter in their front panel. Clean the filter as frequently as possible. If it becomes clogged, heat cannot escape from the inside of the unit.
- Never connect two amplifier outputs in parallel under any circumstances.

5. NOMENCLATURE AND FUNCTIONS

[Front Panel]



① Power switch

Power is switched on () and off () with each depression of this switch.

② Power indicator lamp

Lights green when the power is switched on.

③ Signal indicator lamp

Lights green regardless of the input level control setting when there is an input of a signal with a level exceeding -30 dB.

④ Peak indicator lamp

Lights red if an output signal clips (distortion occurs).

⑤ Protection circuit indicator lamp

Lights red for three seconds after the power is supplied to the unit, and then goes out. This lamp also lights red when a protection circuit is activated. Refer to p. 11 "Table for protection circuit actions" for details.

⑥ Level control bypass indicator lamp

Lights yellow when the level control switch ① (refer to p.6) is in the ON position. While this lamp remains lit, the input level control cannot be used because it is bypassed.

⑦ Carrying handle

Can be detached. Refer to p.9 when removing.

⑧ Input level control (pushlock type)

Clicks at each dB mark on the scale when rotated. This knob is recessed to avoid accidental setting changes. Pressing on the knob raises it above the front panel to permit level adjustment.

[Precautions]

When the level control switch on the rear panel is set to ON, the input level control cannot be used because it is bypassed.

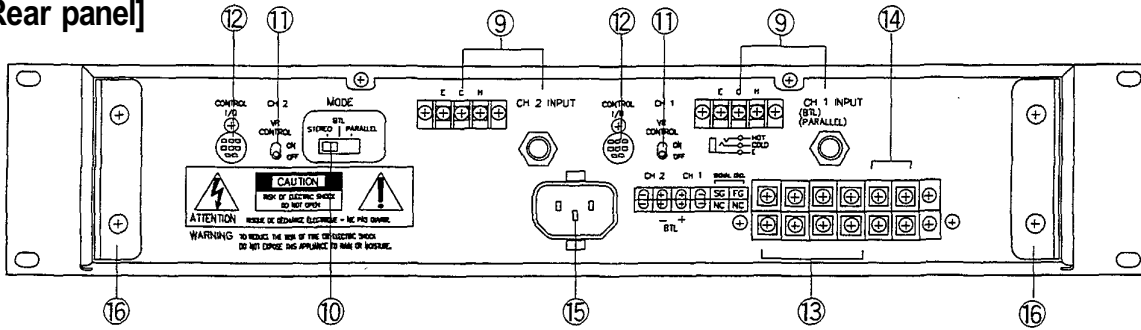
● Level control cover

An input level can be fixed by removing the input level control knob from the front panel and attaching the supplied control cover.

[Note]

Keep the removed input level control knob for future use.

[Rear panel]

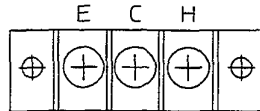


⑨ Input terminal

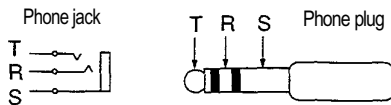
Electrically-balanced input terminals. The 3P screw terminal is connected in parallel with a balanced phone jack.

Also, the input can be converted into a transformer-balanced input using an optional matching transformer LT-101.

- 3P screw terminal
H: HOT
C: COLD
E: GROUND



- Balanced phone jack
T (Tip): HOT R (Ring): COLD S (Sleeve): GROUND



⑩ Output mode selector switch

Selects STEREO, BTL or PARALLEL mode.

- STEREO mode
Channels 1 and 2 are operated independently. (The unit functions as a normal stereo amplifier.) Channel 1 input signal goes to Channel 1 output, and Channel 2 input signal goes to Channel 2 output.
- BTL mode
The unit functions as a monaural amplifier with 1 input and 1 output. Channel 1 input signal goes to both output BTL (+) and (-) terminals.
- PARALLEL mode
The unit functions as a monaural amplifier with 1 input and 2 outputs. Channel 1 input signal goes to the outputs of both Channels 1 and 2. Input signal levels of channels 1 and 2 can be set independently.

[Precautions]

Use only Channel 1 input terminal when in BTL or PARALLEL mode. Do not use Channel 2 input terminal.

Confirm the position of the output mode selector switch before switching on the power. Be sure to switch off the power when changing mode switch settings.

⑪ Level control switch

Usually, set this switch to OFF. When an interface unit is connected, shifting this switch to ON permits external input level adjustment.

[Precautions]

No sound is output if the level control switch is set to ON without connecting an interface unit. Confirm the switch position before switching on the power. Be sure to switch off the power when changing control switch settings.

⑫ Control I/O terminal

Connects to the an interface unit when monitoring or performing remote controls from external equipment. For details, contact your TOA dealer.

[Precautions]

No other unit other than an interface unit must be connected to the terminal. Be sure to switch off the power when connecting an interface unit.

⑬ Output terminal (with a protection cover)

Connect speaker cables to these terminals. Because the upper terminals are connected in parallel with the lower terminals, both terminals can be used simultaneously. Refer to p.8 for speaker cable connections.

[Precautions]

Be sure to switch off the power when connecting the speaker cables. Never connect two amplifier outputs in parallel under any circumstances.

⑭ Grounding terminal for signals

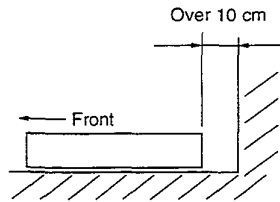
When the power amplifier is connected to other equipment, grounding sometimes creates a loop, producing hum noise. This loop can be cut and noise reduced by removing a shorting metal piece connecting two terminals.

⑮ AC inlet

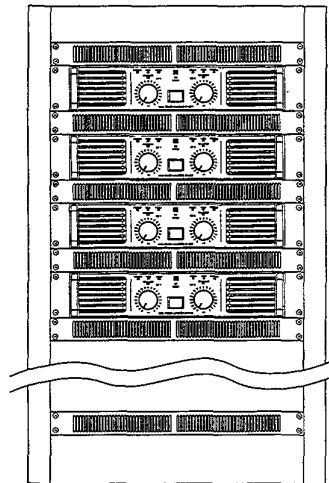
⑯ Rear mounting bracket

6. INSTALLATION

- Carefully note heat radiation when installing the unit. These power amplifiers are equipped with a cooling fan. To avoid heat buildup, ensure that the rear of the unit is at least 10 cm away from the wall surface.



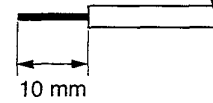
- When mounting the unit in the rack, the inside of the rack must be well ventilated. To accomplish this, keep the rear side of rack open (no panel is mounted), and mount a ventilation panel of over 1-unit size in the uppermost and lowermost rack positions on the rack front.
- When installing in the rack, be sure to mount a perforated panel of over 1-unit size between the amplifiers. See the figure below.



- Robust structure is one of the unit's main features. However, if the strength is particularly needed when installing the unit in the rack, use the supporting runner YA-706 (option) for the safety purposes.

7. CONNECTIONS

1. Switch off the amplifier power.
2. Unscrew the output terminal cover.
3. Strip 10 mm of insulative jacket from the end of the speaker cable, as shown in the figure at right.
4. Connect speaker cables to the output terminals.
5. Fit the output terminal cover in place.



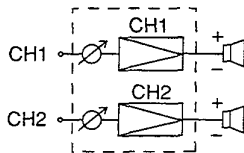
[Precautions] Be sure to fit the output terminal cover in place.

Take care that the naked wires of the speaker lines do not contact the unit's chassis.

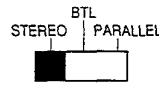
Refer to the figures below for connections for each output mode.

Since the upper output terminals are connected in parallel with the lower terminals, both terminals can be used simultaneously.

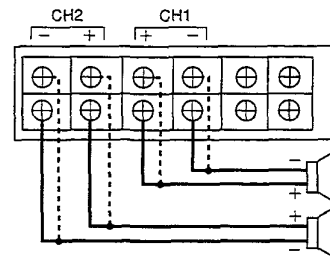
● STEREO mode



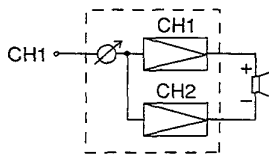
Output mode switch



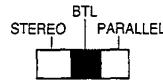
Output terminal



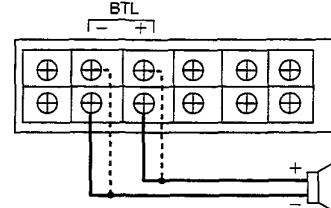
● BTL mode



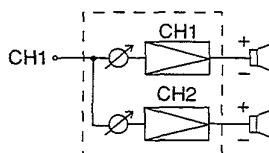
Output mode switch



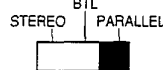
Output terminal



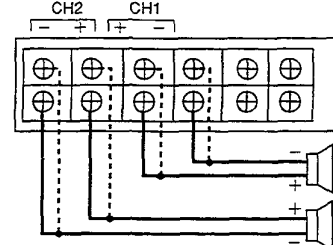
● PARALLEL mode



Output mode switch



Output terminal



[Precautions]

The total impedance of the connected speakers must be over 4 Ω (STEREO and PARALLEL modes) or over 8 Ω (BTL mode). If the impedance of the connected speakers is smaller than those stated above, equipment failures may result.

Refer to the table below when using an optional output transformer.

Power amplifier	Output transformer(option)
IP-600D	MT-600M
IP-450D	MT-450M
IP-300D	MT-300M

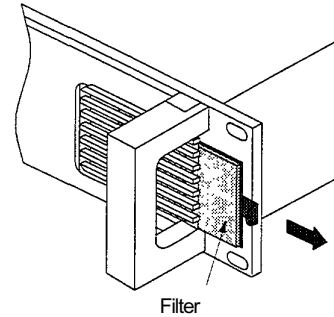
[Precautions]

Do not connect the output transformer under any circumstances when in BTL mode. Both the amplifier and transformer may fail.

8. CLEANING THE FILTER

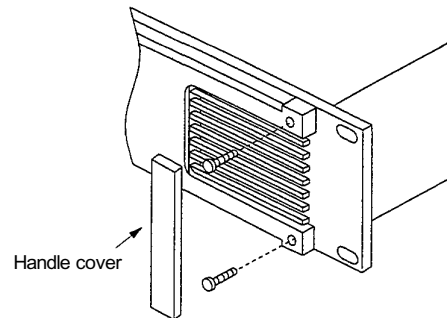
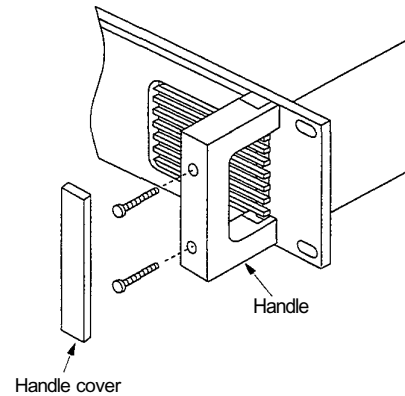
1. Switch off the amplifier power.
2. Pull the filter from the front panel as shown in the figure.
3. Clean the filter.
4. Fit the filter in place.

[Precautions] Make sure that the fan is turned off when removing the filter.



9. REMOVING THE HANDLE

1. Switch off the amplifier power.
2. Remove the handle cover.
3. Remove two screws holding the handle to the amplifier.
4. Remove the handle.
5. Install the supplied screws (M4x20).
6. Attach the handle cover to the unit.

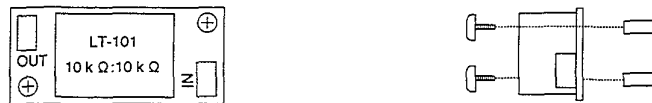


10. INSTALLING AN OPTIONAL MATCHING TRANSFORMER LT-101

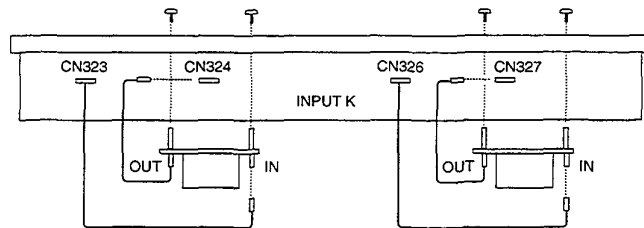
[CAUTION]

THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

1. Attach sleeves supplied with the transformer to the transformer.



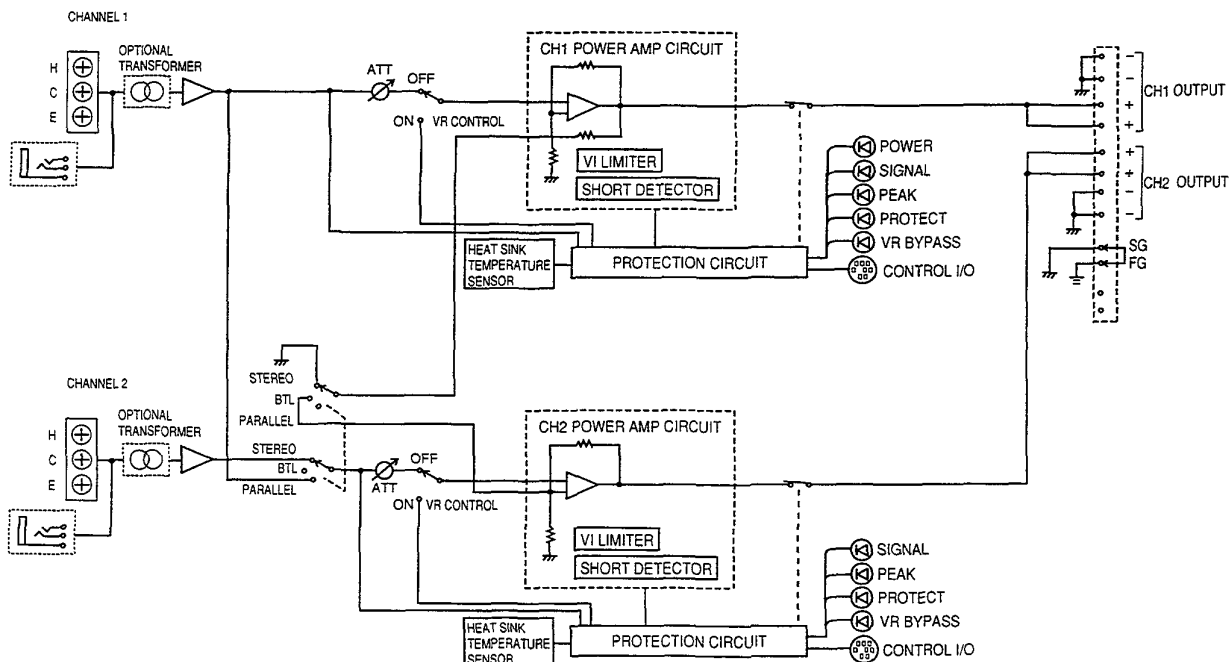
2. Remove case fixing screws to remove the case.
3. When installing the transformer at channel 1, disconnect connector CN323 (with a lead) from CN324. Insert CN323 into the transformer connector marked with IN, then insert the connector (with a lead) from the transformer into CN324. When installing the transformer at channel 2, disconnect connector CN326 (with a lead) from CN327. Insert CN326 into the transformer connector marked with IN, then insert the connector (with a lead) from the transformer into CN327.



4. Mount the transformer to the rear panel.
5. Replace the case.

[Precautions] Make sure that the power is switched off when installing the transformer.

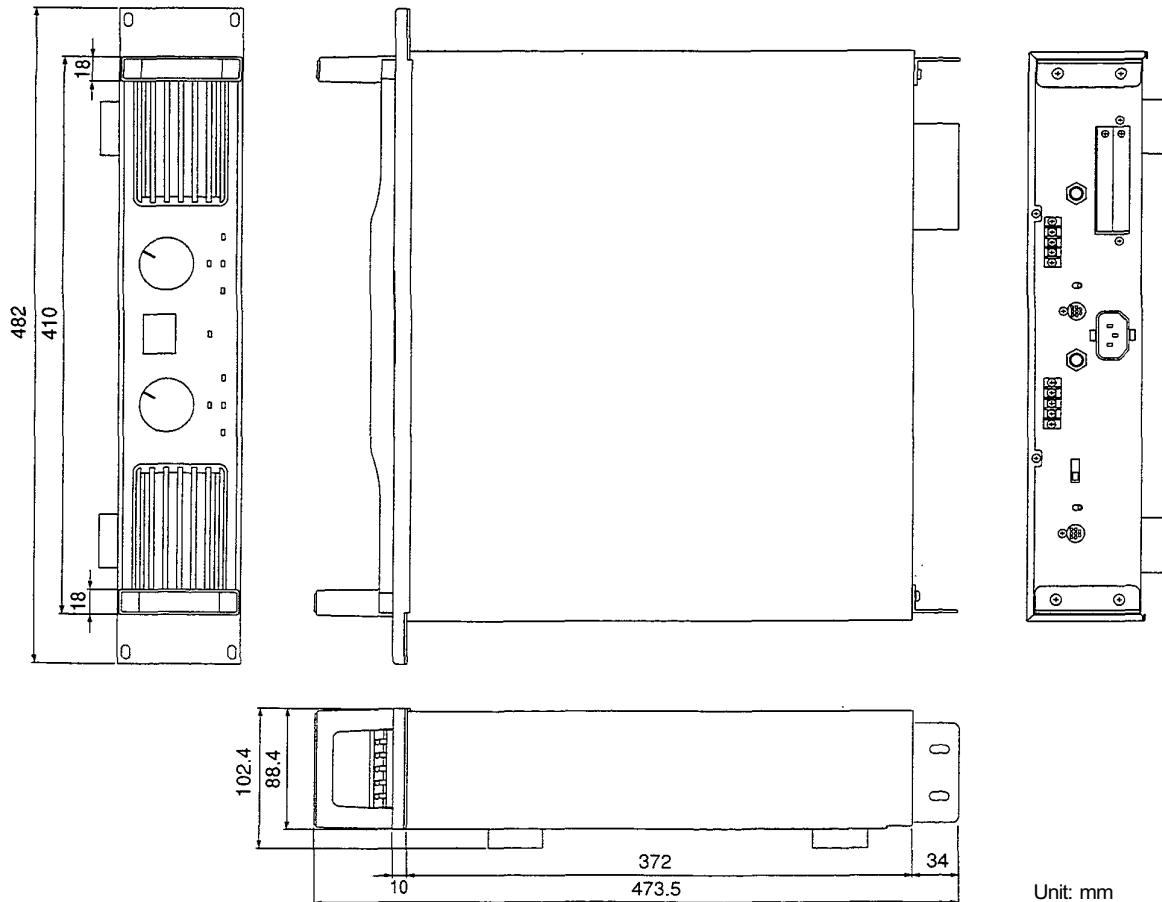
11. BLOCK DIAGRAM



12. TABLE FOR PROTECTION CIRCUIT ACTIONS

Symptom	Action	Indicator	Remedy	Reset
Excessive current flow due to overload	Current limiter operates when load resistance is under 2.5 Ω (STEREO/PARALLEL) or 5 Ω (BTL).	Peak indicator lights.	Remove overload.	Automatically reset if 4 Ω (STEREO/PARALLEL) or 8 Ω (BTL) load is connected.
Short circuit (under 0.5 Ω)	Current limiter operates. Speaker loads cut by output relay.	Protection circuit indicator lights.	Check short circuit of speakers and lines.	Switch power off, connect correct load, and switch power on.
Heat sink temperature rise	Speaker loads cut by output relay.	Protection circuit indicator lights.	Check ventilation and overload.	Automatically reset if temperature drops.
Unusual DC voltage output	Speaker loads cut by output relay.	Protection circuit indicator lights.	Contact your TOA dealer.	Switch power off, then remove cause.

13. APPEARANCE AND DIMENSIONS



14. SPECIFICATIONS

Model No.	IP-300D	IP-450D	IP-600D
Output 20 Hz - 20 kHz STEREO RL=4 Ω RL=8 Ω BTL RL=8 Ω	300 W 200 W 600 W	450 W 300 W 900 W	600 W 400 W 1200 W
Frequency Response	20 Hz - 20 kHz (+0 dB, -0.5 dB)		
Total Harmonic Distortion 8 Ω , 1 kHz 8 Ω , 20 Hz - 20 kHz	0.01% 0.1%		
Intermodulation Distortion 60 Hz : 7kHz= 4:1, 8 Ω	0.03%		
Input Sensitivity (8 Ω, input level control in maximum position)	+2.2 dB (1.00 V) ±0.5 dB	+4.0 dB (1.23 V) ±0.5 dB	+5.3 dB (1.42 V) ±0.5 dB
Voltage Gain	32 dB		
Input Impedance	10 kΩ (electrically-balanced)		
Signal-to-Noise Ratio 20 Hz - 20 kHz	108 dB (at 26 dB gain) 103 dB (at 32 dB max. gain)	110 dB (at 26 dB gain) 105 dB (at 32 dB max. gain)	112 dB (at 26 dB gain) 107 dB (at 32 dB max. gain)
Cooling Fan Speed	Under 40 °C : Stop 40 °C-75 °C : Low to high speed (variable) Over 75 °C : High speed		
Connection Terminal	Input (CH1 , CH2) : screw terminal, balanced phone jack Output : Terminal with screw/washer assembly CONTROL I/O : 8P DIN Power supply : AC inlet		
Indicator	POWER (green), SIGNALx2 (green) , PEAKx2 (red) , PROTECTx2 (red) , VR BYPASS x2 (yellow)		
Power Source	120VAC±10%, 60 Hz		
Power Consumption Based on UL/CSA standards	444 VA	648 VA	984 VA
Finish	Panel: Zinc diecasting, black paint Case: Colored steel plate, black		
Dimensions	482 (W) X 102.4 (H) X 473.5 (D) mm		
Weight	13 kg		18 kg

[Notes]

- 0 dB=0.775 Vrms
- The above specifications are subject to change without notice.

● Accessories

Screw M4x20	4
Power cord (2.5 m)	1
Level control cover	2
Instruction manual	1



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